

Part A**Total marks (15)****Attempt questions 1 – 15****Allow about 30 minutes for this part**

Select the alternative A, B, C or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the grid below.

	A	B	C	D
1				
2				
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13				
14				
15				

1. The Thylacine or Tasmanian tiger was hunted to extinction in the early 1900's. It was superficially quite similar to a wolf or dog, although it had evolved entirely independently of these animals and was in no way related. It was about the size of a collie dog, had a long tail and a wolf like head with short ears and strong jaws and teeth. Its coat is brownish with a series of black stripes across the back. A nocturnal hunter, the thylacine preyed on animals up to the size of small kangaroos.



Wolf



Tasmanian tiger (Thylacine)

What do scientists call this process where two unrelated species evolve to look outwardly similar?

- (A) Divergent evolution
 - (B) Convergent evolution
 - (C) Competition
 - (D) Comparative anatomy
2. One form of juvenile diabetes results from destruction of the insulin producing cells in the pancreas. A recent epidemiological study has identified a higher than national incidence of this disease in certain areas of NSW. What does this suggest as the cause?
- (A) nutritional
 - (B) environmental
 - (C) infectious
 - (D) auto-immune
3. The release of ADH (anti-diuretic hormone) by the pituitary gland will result in which of the following?
- (A) an increase in urine concentration.
 - (B) a decrease in the permeability of the collecting ducts in the kidney.
 - (C) an increase in the uptake of urea from the blood.
 - (D) a decrease in the amount of water reabsorbed into the circulatory system.

4. Which of the following statements best describes the process of cloning frequently used in farming?

(A) The crossing of two genetically different members of the same species.
(B) Inserting DNA from one species into another to produce desirable characteristics.
(C) Artificially selecting desirable characteristics and breeding animals with these.
(D) The production of genetically identical offspring.

5. Which kind of cell plays a key role in the inflammatory response?

(A) B cells
(B) macrophage cells
(C) memory cells
(D) T cells

6. Why was Beadle and Tatum's "one gene-one protein" hypothesis altered to the "one gene-one polypeptide" hypothesis?

(A) some proteins are made up of more than one polypeptide chain each controlled by a different gene.
(B) one gene can control the production of many different polypeptides.
(C) genes only control the production of enzymes.
(D) genes are only control the production of polypeptide chains not proteins.

7. In a species of pea plant, round peas are produced much more often than wrinkled peas. The allele for round is given as (R) and the allele for wrinkled as (r).

When two pea plants that both produce round peas are crossed, some of the offspring produce wrinkled peas. What is the only possible genotype for each parent pea plant?

(A) RR, RR
(B) RR, Rr
(C) Rr, Rr
(D) Rr, rr

8. Which statement best illustrates enantiostasis?
- (A) A constant body temperature prevents enzymes from denaturing
 - (B) Metabolic reaction rates depend on substrate concentration
 - (C) *Amoeba* osmoregulate by expelling excess water via a contractile vacuole
 - (D) Oysters remain closed to avoid contact with brackish water as the tide recedes

9. In 1910, a geneticist called Morgan worked with a mutation that arose in his fruit fly stocks. This mutation caused a white eye instead of the normal red eye colour. He crossed a white-eyed male fly with a normal, red-eyed female. All the first generation had red eyes. However, in the second generation all the females had red-eyes, but half the males had white eyes.

Through further breeding, Morgan eventually got females with white eyes as well. This surprised Morgan, and he carried out a reciprocal cross i.e. he crossed a white-eyed female with a red-eyed male. He found that all the female offspring in the first generation were red-eyed, whereas all the male offspring were white-eyed. In the second generation half of the offspring of each sex were red-eyed, and half were white-eyed.

How did Morgan try to explain these results?

- (A) He reasoned that the gene for eye colour in fruit flies was co-dominant.
 - (B) He explained that the gene for eye colour was located on the X chromosome.
 - (C) He stated that there was no pattern in the inheritance of eye colour in fruit flies.
 - (D) He explained that this pattern of inheritance was due to a mutation in the first generation of flies.
10. Which of these statements could most likely be attributed to Robert Koch?
- (A) life forms originate from other life forms
 - (B) certain diseases are transmitted by insect vectors.
 - (C) the body's mechanism for fighting disease depends on cells being able to recognise self.
 - (D) some specific diseases are caused by bacteria.

11. Which of the following is NOT an example of homeostasis?

- (A) a horse perspiring after running in the Melbourne Cup
- (B) the liver removing glucose from the blood and storing it as glycogen
- (C) expansion of blood vessels in the skin during exercise
- (D) the production of saliva in the mouth while eating

In humans, transplanted organs will trigger an immune response that leads to rejection of the transplanted organ.

12. What is the reason for this immune response?

- (A) The transplanted organ contains phagocytes that destroy the recipient's cells
- (B) Proteins in the transplanted organ react with the recipient's proteins
- (C) Blood in the transplanted organ carries antibodies that cause an immune reaction
- (D) The transplanted organ carries markers that are recognised as foreign by the recipient's T-cells

13. Which mechanism is an example of a specific immune response?

- (A) the destruction of pathogens
- (B) defence adaptations at the point of entry
- (C) increased blood flow to a site of infection
- (D) production of B and T lymphocytes

14. Which of the following statements is correct about the excretion of waste through the kidneys?

- (A) The concentration of urine excreted by terrestrial mammals is fairly constant.
- (B) The concentration of urine excreted by fresh water fish is very dilute.
- (C) The urine produced by marine fish is very dilute because they are constantly drinking water.
- (D) Urine secreted by desert dwelling mammals is generally very dilute, as they need to conserve water.

15. How is oxygen transported around the body by the blood?

- (A) attached to haemoglobin in white blood cells.
- (B) dissolved in the blood plasma.
- (C) carried by the red blood cells.
- (D) transported through the lymphatic system attached to cholesterol molecules.

Question 16 (continued)

Marks

- (a) Explain why not all people that carry the 5-HTT gene on their chromosome will develop depression. 1
- (b) Outline TWO other ways in which the environment may affect the expression of a gene in an individual. 2

Question 17 (4 marks)

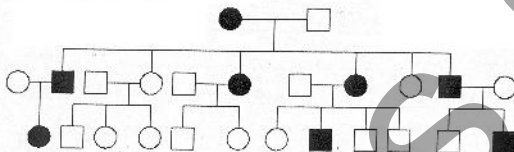
Both endothermic and ectothermic animals can be found living in a wide variety of habitats.

- (a) Explain how an ectothermic animal might respond to the alpine conditions around the Kosciusko ski fields during winter. Explain how this response might assist in temperature regulation. 2
- (b) Name ONE Australian endothermic animal. Describe TWO ways this organism might respond to a large increase in the ambient temperature. 2

Question 18 (4 marks)

Marks

The diagram below is a pedigree for albinism in Humans. Albinism can be any one of a number of genetic conditions that cause a lack of pigment in the eyes, skin and hair of sufferers.



Note: solid or "filled in" shapes denote the presence of that trait.

- (a) Is the allele responsible for albinism dominant or recessive? Justify your answer.

2

- (b) Explain why a professional dog breeder might use a pedigree.

2

Question 19 (4 marks)**Marks**

The human body has a number of defences against pathogens.

- (a) Outline a defence barrier to pathogens.

2

- (b) Compare this defence mechanism to the immune response mediated by B-lymphocytes.

2**Question 20 (7 marks)**

During your Biology course you performed an investigation to identify microbes in food or water.

- (a) Outline the procedure you used.

3

Question 20 continues on next page

- (b) Identify the dependent and independent variables in your investigation.

2

- (c) Identify a safety risk in the investigation you performed.

1

- (d) Outline a safe work practice you employed to minimise any risks in your investigation.

1

Question 21 (4 marks)

- (a) Describe the concept of punctuated equilibrium.

2

- (b) Compare punctuated equilibrium with the process proposed by Darwin.

2

Question 22 (4 marks)

Identify the role of antibiotics in disease management and evaluate their effectiveness in this role.

Question 23 (4 marks)

Construct a table to compare the structure of arteries and veins.

Question 24 (4 marks)

Marks

Trees can grow to over 120 metres in height. Water and dissolved minerals must move from the roots through the xylem to the tips of the shoots. Materials produced in the leaves must be transported through the phloem to the roots and other parts of the plant. Briefly describe the current theory to account for this movement of materials in the:

- (a) Xylem

2

- (b) Phloem

2

Question 25 (6 marks)

In mice, black coat colour is dominant over white coat colour. When a white mouse is crossed with a black mouse, half of the offspring produced are black and half are white.

- (a) Showing your working, determine the genotypes of the parents.

3

- (b) If the black offspring are crossed with one another, what is the genotype ratio and phenotype ratio in the offspring of this cross?

3

Question 26 (3 marks)

Marks

Over a long period of time, most of Australia's plants have evolved mechanisms to survive irregular rainfall and very dry conditions. Describe THREE adaptations Australian plants have acquired through evolution to reduce water loss.

Question 27 (2 marks)

Describe the effect of temperature on the activity of enzymes.

Question 28 (6 marks)

Marks

Explain how processes such as gamete formation and sexual reproduction bring about variability in the offspring of species.

Question 29 (5 marks)

NAME a non-infectious disease that you have studied.

For this named disease describe its:

- occurrence
- symptoms
- cause
- treatment or management measures that are commonly employed.

Question 30 (3 marks)

Identify ONE product extracted from donated blood and discuss the use of such products.

3

Question 31 (3 marks)

Over thousands of years, different societies have advocated cleanliness in food, water and personal hygiene.

(a) Identify ONE way that drinking water may be treated to ensure its cleanliness.

1

(b) Explain how this method reduces the risk of infection from pathogens.

2

Question 32 (5 marks)

During your Biology course, you performed an investigation to examine plant shoots and leaves to gather evidence of pathogens and insect pests.

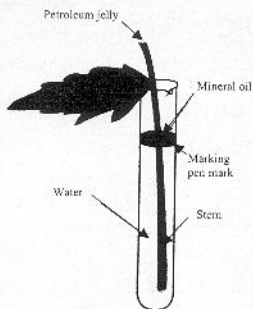
5

Describe the procedure you followed and outline your findings.

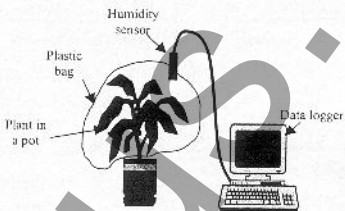
Question 33 (6 marks)

Marks

The diagram shows TWO methods of measuring the rate of transpiration from leaves.



(a) Measuring transpiration of a single leaf (destructive testing)



(b) Measuring transpiration of a whole plant (non-destructive testing)

- (a) Discuss the differences between these two methods of measuring transpiration and explain why they may produce different results.

4

- (b) Draw a diagram to show an adaptation of a named Australian plant that assists it to minimise water loss.

2

Question 34 (8 marks)

Marks

Using examples, evaluate the impact of current reproductive technologies on the path of evolution.

8